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Audio-Visual Aids in Education

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Editor: MARGARET BENJAMIN

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EDITORIAL

'TRADITIONALLY, language deputizes for what has to be absent. It tells us what we might see or hear. But it too often gets in the way of, or replaces, all that could give it a meaning. Now that things and events themselves can be brought to us, the role of language is reversed. Instead of words having to explain and represent things, it is rather things which explain words or call them in question.'[1]

Audio-visual aids then can be simply defined as a device for illustrating language, written and spoken. Audio-visual aids are as old as history; India particularly has been rich in colour and variety in these as a means of mass communication. Her architectural monuments, her frescoes and paintings, calligraphy, her folk drama and art have been traditional methods of mass education.

The articles in this issue present various aspects of what can, and should, be done in order to make audio-visual aids an effective means of educating the young, and it is heartening to find that there is an awakening and consciousness of the fact that modern means can be effectively adapted for use in children's education.

I wish to offer a few remarks on the development and progress made in some western countries which have made rapid advances in audio-visual education during the last thirty years. It is with the hope that these remarks will be of some help to those of us who have become conscious of the value of these aids which have broadened the basis of teaching practice, and also to the higher authorities who are planning visual education and broadcasting schemes in education.

In England broadcasting and visual aids are of recent development. While in 1940 there were only 300 sound projectors in schools, at the end of 1951 there were over 5,000 being used. The National Committee for Visual Aids in Education, which is representative of Local Education Committees, is principally concerned with the production and preparation of programmes for schools. The Educational Foundation of Visual Aids is a non-profit-making educational trust whose chief object is to supply films to schools. The films are produced in the

[1] Harvard Report on *General Education in a Free Society*.

majority by commercial firms, but the important aspect which we in India have to remember is that there is complete co-ordination between these committees, the commercial organizations and the teaching world. The commercial firms apply to the Educational Foundation which in conjunction with the National Committee arranges for an experienced teacher to be attached as an adviser in the production of films.

The Foundation Film Library has 1,200 titles of films and 2,000 titles of filmstrips. A hire scheme entitles each school to borrow films at a low cost. The schools may even buy films. Many schools have their own filmstrips. The Foundation also advises teachers on the educational value of films and lays down specifications for halls for visual instruction in new school buildings.

School broadcasting in England began only in 1924 and here again its efficiency and development have been due entirely to the continuous co-ordination between the B.B.C. and the various educational systems and the teaching world. Teachers play an important part in the Central Council of School Broadcasting, by belonging to the B.B.C. School Broadcasts panels. The advice of teachers is sought in the preparation and following up of programmes and in the publication of illustrated pamphlets on school broadcasts. Regional conferences are held of teachers of the School Department of the B.B.C. and teacher-training institutions. In Great Britain, while the system, of education is extremely decentralized, it has a highly centralized broadcasting system, but a system which is free from Government and commercial control. The Association of Education Committees says: 'The School Broadcasting service in this country is unmatched elsewhere in the high quality of the planning and execution of its programmes.'

The year 1920 roughly marks the modern interest in audio-visual education in the United States of America. There is the Department of Visual Instruction of the National Education Association. Specialists serve on the Visual Education Department, whose duty is to 'compile and disseminate information relative to the use of films and radio in education'. In a country as large as the United States, no scheme of audio-visual education can be highly centralized. A considerable amount of freedom is exercised in the different states, in the use and technique of audio-visual aids, and there is also a wide range between schools in different parts of the country.

The Visual Education section is the co-ordinating agency which prints and distributes catalogues of Government films, provides information about the location of films, furnishes guidance and gives suggestions. It organizes study groups, teachers' meetings and exchanges of films with other countries.

In America several individual states have taken the lead in advancing the use of audio-visual materials and techniques. Some states such as Ohio and Montana have set up state exchanges and libraries for distribution of materials at a low cost. In Pennsylvania and California, preparation in audio-visual materials and techniques has been made compulsory for

teacher-training. Other states conduct summer-school and evening classes in the use of these aids. Within state organizations there are the contributions made by the cities. Nearly every large city has a director in the visual department of education with a staff. This cannot be said to be true in the rural areas where the development of audio-visual techniques has been slow. In many cases rural schools are poorly financed and poorly equipped in this respect. There exists a large gap between the educational opportunities provided for the urban and those for the rural schools.

There is one other aspect of education by visual aids that deserves consideration and that is the production of films produced entirely for children's entertainment and indirectly as a means of informal education. There are only two countries that have taken this seriously and have concerned themselves about what children see when they go to the cinema, and have a sustained production of such films for children. One is Great Britain and the other is the U.S.S.R., which has concentrated on children's theatres with immense power and energy. Children's tastes in entertainment can be changed or at least directed, without the children realizing it.

The J. Arthur Rank organization in England first undertook the intensive production of children's entertainment films. When it stopped about a year ago the production was carried on by the Children's Films Foundation which is run by large trade organizations.

The U.S.S.R. provides special theatres and cinemas for its youth and affords opportunities for the appreciation of art as self-expression within the limits of youthful experience. A children's theatre—the best of its kind is the First Children's Theatre in Moscow—has its own permanent orchestra, producers, scenic designers, etc., with an educationist on the staff who serves as an active link between the school and the theatre. The children's cinemas also receive considerable attention from the authorities. There is a special department of the film industry for the production of children's films. The Soviet Union certainly takes children's leisure seriously and the effort is 'profoundly educational and social in its conception and interpretation'.[1]

As I have stated, we in India have many lessons to learn and many modifications and adaptations to make because our problems are peculiar. The high percentage of illiteracy limits the use of books and newspapers. The variety of languages in current use, particularly in rural and border areas, defeats to some extent the effectiveness of the use of the radio, even in adult education programmes. The making of radios and projectors is still in an embryonic stage and all equipment has to be imported from abroad, which increases financial liabilities. It is surprising that while India has the second largest film industry in the world, commercial enterprise has not given a thought to children's entertainment. Whatever exists in the form of educational films (and

[1] King, Beatrice, *Russia Goes to School* (Heinemann), 1948.

most of these are foreign films) either in the Central Film Library at Delhi or in states like Bombay and Madras which have made some progress in this direction, is far from adequate.

In many states schemes for audio-visual education are in action, though mostly for adult education programmes. It is a moot point as to which should take priority—the education of the adult or the education of the child—at this stage of the country's development.

The contributions in this issue are devoted entirely to two aids, namely, the radio and the film. Audio-visual aids also include a large variety of other materials—the blackboard, charts, pictures, posters, graphs, models, maps, the stereoscope, the telescope, the magic lantern, the episcope, the epidiascope, the gramophone, dramatics, school museums, school journeys and excursions.

Perhaps a helpful and useful issue of TEACHING could be brought out in September in continuation of this number if contributors concentrate on some of these other audio-visual aids and send articles dealing with their effective uses.

AUDIO-VISUAL AIDS IN EDUCATION

Their Importance and Potentialities

IT IS a little unnatural to consider any one teaching tool in isolation; the problem is not 'When do I use films?' but 'How best can I provide an educational situation in which these children can grow and develop?' or, more specifically, 'In what ways will the children most clearly and permanently absorb this particular experience or skill? Will it be by going on a field trip, by reading books, by acting a story, by writing a story, by laboratory bench-work, from a radio programme, a diagram, or a moving film?' In order to arrive at a solution of an educational problem of this kind it is essential to analyse the problem and to possess a knowledge of the sensitivities and experience of the children, and to develop understanding of the potentialities of the 'tools' available to the teacher. Though I do maintain that all these tools should be considered in relation to each other when selecting one to meet a particular educational requirement, in this article I propose to discuss a certain set of tools in isolation, in order to be the more free to examine their respective potentialities.

In the rather loose category 'audio-visual aids' I include sound and silent films, filmstrips and miniature slides and every kind of wall-sheet or poster. They have nothing in common except that they are meant to be *looked* at and they are all important sociologically. We live in 'the age of the eye'; our children, especially those in cities, learn an immense amount by looking at advertisements, and by going to the cinema; they have come to accept 'visual statements' as readily as they do verbal ones. Pictures of one sort or another are part of the fabric of our social structure and have become an important means of communicating facts, attitudes and values. As responsible adults we cannot afford to ignore that which is part of our children's lives and as teachers we are wise to use every means of communication to further our educational ends.

Most persons concerned with children agree that they observe keenly and accurately; this ability in itself does not necessarily educate the child; the observations and the knowledge acquired must be organized into patterns and coherent wholes. The educative process at all levels is concerned with five major activities, to some of which no 'tool' can make any contribution, but which are mainly a function of the teacher's wisdom and experience, discharged by the guiding and selecting of the children's activities. I list the major purposes of the educational process (whatever the all-embracing aim may be) as follows:

1. Teaching skills
2. Teaching facts
3. Stimulating activity which leads to new experience
4. Establishing attitudes
5. Establishing habits of behaviour
6. Establishing habits of thinking

For 1, 2, 3 and 4, we use such teaching tools as the blackboard, books, stories, pictures, films, cartoons, field trips; 5 and 6 are achieved by constant routine, by the teacher's guidance and correction which depend on her judgement, her selection of experiences to which the children are exposed, her arrangement of sequences of activities. To my mind there are quite specific limits to the use of audio-visual aids; for example, no film can establish the habit of thinking about problems in a scientific way; no picture can establish the habit of behaving courteously to our neighbours, though all visual means of communication can assist in teaching skills (like sewing or using a microscope), in telling about facts and their relationships (like flowers having pollen and bees collecting it) or in establishing attitudes (these are emotionally linked and all pictures can be evocative, depending on their social context).

Now let us examine the visual aids to education in turn and see how they can contribute to these four major teaching tasks.

Films

Only because the pictures in a film move and because pieces of film can be edited, has it properties unlike those of photographs in general. But these two properties give it immense range. Professor T. L. Green in his article, 'Visual Aids and the Biology Teacher', in the March 1951 issue of TEACHING, has drawn attention to such points as independence of time and space, micro- and macro-photography; these are all properties conferred by the still camera and are not the peculiar gift of the ciné-camera; only movement, whether normal, speeded up or slowed down, are typical of the cinema. By editing, cutting in one situation into another, an immensely dramatic and, therefore, emotional effect may be obtained. An effect which may be heightened by using natural sound to increase the illusion of reality, music to evoke a mood, or commentary to clarify meaning and focus attention. All this makes film the over-rich, powerful, hypnotic, dramatic, often confusing, thing it is; and, therefore, not always a good tool for teaching purposes.

Using films—For teaching purposes, films should be used to show *relationships between known facts*; when items are familiar, the film can help in showing how these items move in relation to one another. It is important to note here that the film is effective only in so far as the items are familiar and recognized. (This is one of the reasons for the great value of films for teaching social sciences, since they are concerned with statements about relations between men and women and the institutions they set up.) The film as a teaching tool, then, rests on the shoulders of all other teaching devices. For example, in teaching about the internal combustion engine the order of procedure might be:

(*a*) Look at a motor-car engine
(*b*) Take it to pieces

(*c*) Study a diagram of its component parts

(This gives opportunity to become familiar with the structure, i.e., the individual items of which the engine is composed.)

(*d*) Show a film of the engine working, using both actuality shots and animated diagrams.

The special quality of film—its power to depict movement—is thus appropriately utilized. This simple example also demonstrates that the special property of film is both its power and its limitation, since the movement makes it impossible to study structure.

Methods of Use—Methods of use must always be discussed in terms of educational ends, themselves determined by the social context, the type of the school and the particular class in which the teacher is serving. It is, therefore, unwise and unrealistic to make general statements about methods of using any visual aid, other than those observations already made by Professor Green in his article on 'Visual Aids and the Biology Teacher'. But it is legitimate as well as useful to draw on the experience of those who have used films for a number of years.

When teaching skills (demonstrating any small-scale manipulation, for example 'How to take a Melting Point'), many teachers first show the film in sections, each section closely related to actual bench-work, when the separate techniques can be tried out and to some extent mastered; they then show the film through once, without interruption, so that the new skill can be appreciated as a continuous series of movements or techniques. To show the entire film through before bench practice often discourages the learners because the whole procedure appears to be very complex and the film defeats the teacher's aim by setting up emotional blocks against learning. Appropriately used, films of this kind are very useful and economic because the camera can observe movements from many points of view: the movements can be analysed, separated, slowed down or magnified, and perfect performers can be used to demonstrate the skills. Examples of such films are 'Cricket Batting Strokes' and many other films about sport.

With films which give facts (*instructional* films which show the relationships between items, or attempt to give an 'exposition') the best results seem to be obtained when two conditions are observed. First of all, the subject-matter is familiar in that the items are *known*; secondly, the film is shown *twice*, with an interval of at least one day, during which time there has been a discussion of the points made in the film. More frequent screenings do not yield a marked increment in learning (confirmed by both American and Australian experimenters). Without the discussion, obscurities or omissions in previous learning, which inhibit the acquisition of new knowledge, are not removed.

In order to *stimulate* a class into new activity or interest, the selection and the timing of the presentation of the film are most

important. One showing is clearly enough, and the kind of discussion which follows may need to be guided in order to arrive at the desired point of departure for the children. The selection, the timing and the follow-up depend entirely on the teacher's experience and intuition; no better guide can be given than an invitation to try, note reactions and try again. It is the work arising out of the film that is important.

With my fourth general category the 'build-up' before using a film to establish or to modify attitudes is more important than anything else. For the success of its message, the context in which the film-viewing occurs is the determining factor. In other words, a film by itself will not serve to change people's beliefs, especially when these are rooted deep in the fundamental experiences of childhood. Furthermore, we are all selective viewers, taking in only those aspects of our experiences for which we are ready, or towards which we already have favourable attitudes. Thus, the proper place for a propaganda film (such as one intended to inculcate positive attitudes towards tooth-brushing or towards the idea of international co-operation) is within a matrix of other propaganda materials; at its best it can 'tip the scales' when an audience is already wavering on the edge of taking up a new attitude.

Filmstrips

As Professor Green has pointed out, filmstrips consist of a series of pictures, which may be photographs or diagrams, in fact any kind of picture, which is diascopically projected on to a screen. Because most commercially made filmstrips are photographed on to the strip of film from master cards, it is possible to modify the original material considerably; a photograph can be touched up, items can be superimposed or special drawings can be made, using the full range of tone contrast. On projecting this material, it often acquires a three-dimensional quality of very great value in descriptive teaching. This possibility of controlling the initial material, together with the fact that the sequence of pictures is determined, are the peculiar properties of filmstrip, and its limitations. Many teachers prefer to cut up filmstrips, mounting the pictures in separate slides; the 'aid', of course, then ceases to be a filmstrip. But some subject-matter lends itself to presentation in a close-step series of still pictures, and in this case the filmstrip is the ideal medium for communicating knowledge, especially of structural details: for example, the stages in the development of a butterfly from egg to adult. Sometimes, too, it is necessary to present a series of descriptive statements in order to establish a picture of a total situation which is then summarized in an organizational chart: for example, when describing a social service such as the School Health Service, a series of photographs of aspects of the work can give a total 'personalized' picture, which may then be made into a general, depersonalized visual statement (in the form of an organizational chart) about the functions of the School Health Service.

Using filmstrips—As with films, it is impossible to discuss methods of use without taking into account the educational ends, the quality of the class, the previous experience and knowledge on which the lesson is being based. Indeed, there are a great many ways in which filmstrips or parts of them may be used (see *Filmstrips*, published at 1*s* 3*d* by the N.C.V.A.E., 33 Queen Anne Street, London, W.1.) and here I can only suggest a few lines of thought.

When teaching skills, a series of still pictures are sometimes useful, if projected in conditions of controlled daylight which make it possible for the children to study the picture and to compare it with their own actions; for example, when learning to do metal-filing, it is important to take up a correct stance and to apply pressure to the file in the right way. Pictures of these two positions can be held on the screen while each child examines and adjusts his own stance, or the position of his hands.

The most general use of filmstrips, of course, is in descriptive teaching where the pictures provide visual statements about items or situations. As in all cases where the aim of the lesson is the acquisition of facts, the active co-operation of the children is an essential contributory factor. To elicit that co-operation from the children the teacher must use judgement in selecting material and timing its presentation; he must have skill in arousing curiosity and interest, and have sensitivity to such matters as attention-span, and acceptable degrees of difficulty of exercises. All these factors govern the way in which filmstrips are used for teaching facts. The best advice I can give is this—do not try to teach the facts; help the children to discover them from the pictures you have chosen to show them; gear the selection and number of pictures to the abilities of the children. Get the children to be active learners rather than passive absorbers. It is worth noting here that filmstrips often complement films and that the two media can often provide good learning situations. For example, in teaching about digestion, the filmstrip can provide visual description of the structure of the digestive tract, while the film can show how the parts move during the digestive process.

Still pictures, whether presented singly or in a series, seldom serve to stimulate a new activity or to modify attitudes, unless they are quite deliberately used for that purpose by the teacher. The pictures in this case are incidental and serve only to tip the scales. I have seen four pictures from a filmstrip on Roman Britain used in this way by a teacher during a 40-minute lesson with 12-year-old children. By skilful questioning and by conveying his own lively interest in the subject, he succeeded in stimulating the children into doing a small project on 'Romans in London'. The four pictures he chose were incidental and useful only as a springboard; it was not due to an inherent property of the filmstrip that the pictures were effective stimulants.

Wall-sheets

The range and variety of still pictures are so great that a whole illustrated article should be devoted to these alone. It is difficult to analyse this huge field intelligibly without showing examples, especially as categories are not yet established or generally accepted. The term 'wall-sheets' may include realistic drawings and photographs, silhouettes, cartoon-style drawings, diagrams, maps, organizational charts. They may be coloured or in monochrome; they may be large or small, single or in sets. Professor Green lists four categories, the selective principle being that of visual style. I shall list four categories based on function But whatever the analytic approach, the distinguishing feature of all wall-sheets is the opportunity afforded for leisurely, direct comparison; the eye is free to wander around the field, to linger or to jump from point to point. To quote an analogy of Otto Neurath's, collections of still pictures can present a network of interrelated facts, whereas a filmstrip can present only a chain of connected facts. This has of course profound educational significance. If we are concerned not only with the acquisition of knowledge, but also with the organization of knowledge; if we are engaged in establishing habits of scientific thinking as well as in helping children to learn skills and facts; if also, we are unwilling to impose our authoritarian tendencies on the freedom of the children, we must provide endless opportunities for studying comparisons and for exercising choice. It may seem far-fetched to suggest that constant use of films and filmstrips, in place of collections of wall-sheets or of illustrated booklets, reduces the opportunities for the development of habits of scientific thinking or of democratic behaviour. But there is something in this notion; it is part of the general modern tendency towards centralized controls, mass instruction and mass reaction, the totalitarian disregard for individual needs and speeds and tastes.

Using wall-sheets—The four functional categories to which I referred earlier are of course based on the four teaching functions given at the beginning of this article. Within that framework much remains to be said, to be ordered and to be discovered.

Series of drawings are often used to teach skills, especially in domestic or industrial crafts: for example, 'How to turn up a hem' or 'How to operate a machine'. For their success they depend on skilful drawing and on awareness, on the part of the learner, of the need to acquire the skill.

Wall-sheets are most frequently used to give visual descriptions of specific items (e.g., pictures of flowers), or to show relationships between items within an organization (e.g., organizational charts). For their effectiveness these depend upon the visual habits of the community and on layout and design. In order to use such material successfully, all the conditions operating in any learning situation apply, with equal force, as in using filmstrips and films.

In order to stimulate a class, it is necessary to provoke discussion. This is most easily achieved by presenting material for comparison. The effectiveness of this discussion material depends on the arrangement of the items. The layout of the items to be compared should be such that the visual emphasis is on the dissimilarities, because these are more easily observed by the eye.[1]

Lastly, in using wall-sheets or posters to modify attitudes, all the psychological conditions for promoting propaganda come into play. The effectiveness of the pictures depends on their emotional appeal and on the social values (*mores*) of the group for whom the propaganda is intended. For example, a famous picture appealing to Americans to buy war bonds is based on the general emotional appeal of Christian religious attitudes and on the value placed on money in the U.S.A. The same picture would be meaningless in, say, a Muslim community, valuing money less than the dignity accruing to old age. In order to modify children's attitudes (a perfectly legitimate activity) by using propaganda pictures, these points—emotional appeal and the social values of childhood—must be borne in mind. To be considered also is the need for variety. Propaganda depends on shock-tactics, and it will not serve any good end to leave up for weeks a poster about the dangers of fly-ridden food.

Visual ways of communicating knowledge have always been used by teachers; today we have a greater variety of visual tools than ever before. These can greatly enrich school life and can contribute much to the educative process. But their wise use comes only from careful study and continual assessment of aims and effects; it is important to acknowledge the powers and limitations of all our teaching tools and to employ them in accordance with the needs of the educational situation.

HELEN COPPEN

[1] See Sir Frederic Bartlett, *The Mind at Work and Play* (Allen and Unwin), 1951.

HOW TO MAKE VISUAL AIDS APPARATUS

Visual Aids at Least Cost

Introduction

Those who wish to use visual aids in teaching are at once confronted with the problem of costs. This is true in England where visual education has a fairly long history, and perhaps even more true in India, where the use of visual aids in teaching is more recent. Fortunately it is possible to reduce the costs involved in several ways of which the three most important are:

(*a*) *By realizing that visual aids include far more than the moving-picture projector.* The moving-picture film has so many important qualities of value to the teacher and makes so strong an appeal to our liking for the latest thing in 'gadgets', that we sometimes forget the existence of many cheaper methods of visual teaching. The film-strip, the lantern slide and the episcope all cost less to buy, and the materials for projection also cost less.

(*b*) *By remembering that many visual aids can be used without a projector.* Throughout her history India has made use of visual presentation, in carving, painting, ornament and the like, all of which had a story to tell in the world's only universal language—the visual image: and for none of which was a projector used.

(*c*) *By making one's own visual apparatus and visual materials.* While many amateurs have even made their own moving-picture projectors it is a task requiring very considerable skill and resources. Still projectors, filmstrip projectors, lanterns and episcopes however are far easier to make and cost much less. The materials they use, filmstrips and lantern plates for example, can also be made by the amateur. Then there are models of various kinds, posters, wall-charts and the like, which can be made by teachers and by pupils too.

It is the purpose of this article to offer some guiding suggestions on a few of the more important points. In so short a space it is not possible to enter into any of the details of construction but those who are interested will find them in a forthcoming book.[1]

Materials

The teacher who wants to make visual aids apparatus and materials should make a point of collecting what is often looked upon as junk. Some useful items are:

(*a*) *Constructional materials*

Empty tins of various shapes and sizes, pieces of wood, especially hard planking and plywood. Lenses from broken spectacles, binoculars, reading glasses, etc. Electrical fittings—

[1] Green, T. L., *The Visual Approach to Teaching* (Oxford University Press). *In preparation.*

plugs, sockets, switches, wire, etc. Sheet cardboard and cardboard boxes, coloured paper, tracing paper, sheets of brown paper, odd screws, nails, nuts and bolts.

(*b*) *Illustrative materials*

Out-of-date illustrated magazines, posters, diagrams, advertising pamphlets and brochures.

Tools and Skills

A lot can be done with very few tools, and enthusiasm and determination are at least as important as skill. So far as tools are concerned the following are useful:

A tenon-saw for sawing plank-wood; a fret-saw for cutting curves, especially in plywood; and a hack-saw for cutting metal.

Gimlets, bradawl or hand-drill for boring small holes; a hammer, a screwdriver, a tinman's snips (shears) for cutting thin sheet metal (e.g., tin plate), pliers and files.

An old table or strong bench is useful, especially if fitted with a vice, but a box top will do.

A soldering iron is very useful, but rather a luxury.

For illustrative work—brushes, crayons, paints, etc.

Methods

It is impossible to describe all the methods, but common sense and trial-and-error are excellent teachers. So far as projection and other apparatus are concerned it should be possible to get advice and help from the physics teacher and the handicraft instructor. The optical principles involved are simple and there is no difficulty in understanding them. It is however important to acquire the minimum of understanding—this will act as a guiding principle and act as a basis for the modifications which circumstance thrusts on all who work with 'junk' as their constructional material.

In relation to illustration the first thing to learn is that one does not have to be an artist. Excellent posters and wall diagrams can be made by simply cutting out magazine pictures and sticking them down on a stiff paper base in new arrangements to illustrate a specific point.

Illumination

All forms of projection need illumination. The possible methods are:

(*a*) Electrical mains current—the most convenient, but not always available.

(*b*) Car battery—6 or 12 volt— needs transport to a charging station.

(*c*) Wind-generated current—car dynamo operated by a windmill built from a bicycle wheel, using a battery and 'cut-out'.

(*d*) Kerosene (paraffin)—pressure-operated lamp with incandescent mantle.

(*e*) Sunlight—little used, readily available and used with the aid of a signalling mirror to project beam from outside into projection apparatus.

Whatever form of illuminant is used it is essential to provide means of altering the position of the lamp so that the bright spot (the filament or mantle) is on the optical axis, i.e. properly centred, and also at the right distance from the condenser lens.

Blackout and Projection

Large-sized screen pictures, low-powered lamps and the episcope all require some degree of blackout if the picture is to be bright enough to be seen. Frame buildings, the cost of blackout materials and the problems of ventilation all suggest that more use should be made of daylight projection, which will be described in another issue.

Apparatus

The Standard Projection Lantern (Lantern slides, British Standard, are $3\frac{1}{4}'' \times 3\frac{1}{4}''$.)

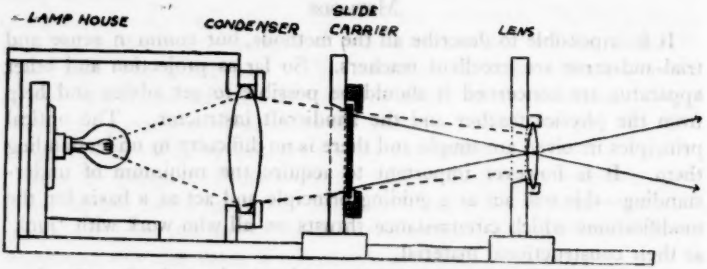

Fig. 1. Diagrammatic section of a Projection Lantern

The lamp is centred on the optical axis and the lampstand can be moved forwards and backwards. Condenser, lens and slide are held in slots. The carrier and lens can be slid along the baseboard.

The structure of this is shown in Fig. 1. It consists of:

(*a*) *Baseboard* about 24″ long and 6″ wide, along which the remaining parts can slide. This is achieved by a central slot with a guide bolt, or by making the sides of the board slope as shown in Fig. 2.

(*b*) *Lamp house*, which can be made from tin or wood. In either case there must be a door to give access to the lamp and there should be some ventilation holes with a light-trap.

(*c*) *Lamp holder*, most easily made of wood, arranged to slide, and carrying a lamp socket lying exactly on the optical axis.

(*d*) *Condenser lens* (bi-convex) or lenses (two plano-convex lenses) which converge light rays through the lantern slide and into the projection lens. A 5″ or 6″ reading lens will do.

(*e*) *Slide carrier*, made of plywood and arranged to slide on the baseboard and carrying grooves through which the lantern slides pass. A simple carrier is shown in Fig. 2.

(*f*) *Lens carrier* arranged to slide on the baseboard and holding the lens. The cheapest and most easily obtained lens is a spectacle lens from an optician or a cheap bi-convex lens from a dealer in scientific apparatus. The diameter should be about 2″ and the focal length about 5″.

When using a kerosene lamp make the lamp house from a large tin, e.g., a 7 lb biscuit tin.

If a mains current is available, a 100-watt pre-focus projector lamp can be used; though it will be cheaper, and less effective, to use a 100-watt pearl domestic bulb. If a car battery is used, a 40-watt or 60-watt headlamp bulb is used with it.

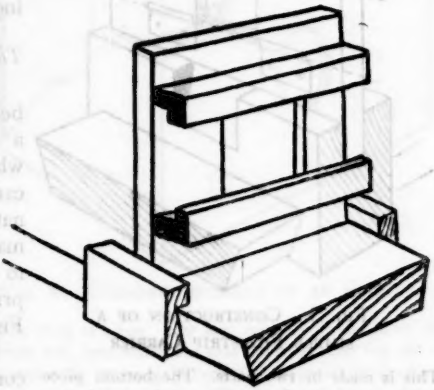

FIG. 2. CONSTRUCTION OF A SIMPLE SLIDE CARRIER

Note the sloping sides of the baseboard. The carrier is a vertical sheet of plywood with a square aperture 3 × 3 inches. The slide passes through the grooves above and below it, which are each built up from two wooden strips.

The Filmstrip Projector

This is merely a miniature projection lantern with a special carrier and a short-focus lens. It can be much smaller and the lamp house is conveniently made from a tin about 6″ × 4″ × 3″. With mains, use a 60- or 100-watt pre-focus bulb, or use a car battery and headlamp bulb. The condenser lens should have a diameter of 2½″ or 3″. The projection lens can again be an optician's lens with a focal length of about 3″.

Apart from being smaller in size the other main difference is the carrier, which has to deal with filmstrips, 35 mm. wide, instead of large lantern plates. A suitable—and very simple—design is shown in Fig. 3.

It is important to note that the frames (picture size) in commercial filmstrips can be horizontal or vertical and are of two sizes, 36 × 24 mm. (double frame) and 24 × 18 mm. (single frame).

Four carriers are therefore required, two for each size. Each carrier can accommodate either horizontal or vertical frames as shown in Fig. 3.

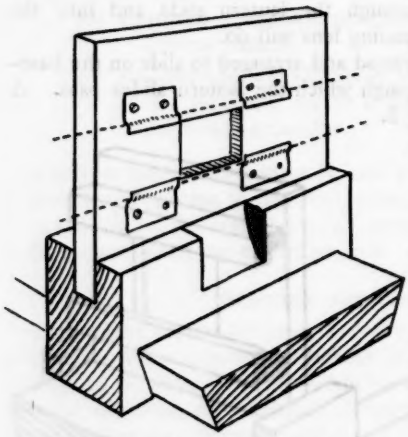

FIG. 3. CONSTRUCTION OF A SIMPLE FILMSTRIP CARRIER

This is made in two parts. The bottom piece slides along the baseboard and has a sloping surface cut to allow the passage of strips when used vertically. The top piece is square and is a tight push-pull fit into the bottom piece. The strip is held by four pieces of brass sheet bent as shown. The model shown is for 36 × 24 mm. (double frame) horizontal pictures and the projection aperture is 36 × 24 mm. Modifications of the same idea can be used with single-frame pictures and for vertical pictures.

In the design shown the filmstrip is pulled by hand. Those with skill and suitable resources can make a more elaborate affair with a winding device.

The Episcope

The episcope is merely a box with a lens, lamps and a picture aperture against which a diagram or postcard can be held. This is illuminated by the lamps and a magnified image is thrown on to a screen. The general principles are shown in Fig. 4.

Electric lamps are the most convenient: two 100-watt lamps operated from a mains supply, or four 40-watt car headlamps operated by a car battery.

It is important to note the following points:

(*a*) Episcope projection, which depends upon reflected light, needs a nearly dark room or the use of a translucent screen. (For this see article on 'Daylight Projection', in a later issue.)

(*b*) With the simple design shown the image is inverted both horizontally and vertically—so that it would appear upside down and reversed from right to left. The former is simply dealt with by putting the original picture in position in the picture aperture *upside down*. Lateral inversion can be overcome in two ways:

(*i*) by using a translucent screen.

(*ii*) by using a mirror between the lens and an opaque screen.

The *advantages* of the episcope are:

(*a*) There is no need to make special slides by a photographic process.

(*b*) Any material of suitable size can be projected, whether it is a picture in a book, a picture postcard, part of a map, or even a small object such as a coin.

(*c*) The image formed is in the colours of the original.

(*d*) It can be used for making enlarged diagrams.

The *disadvantages* are:

(*a*) Need for a darkened room, unless using daylight projection.

(*b*) Restricted size of picture aperture.

(*c*) Loss of intensity of illumination because use is made of light reflected from the original.

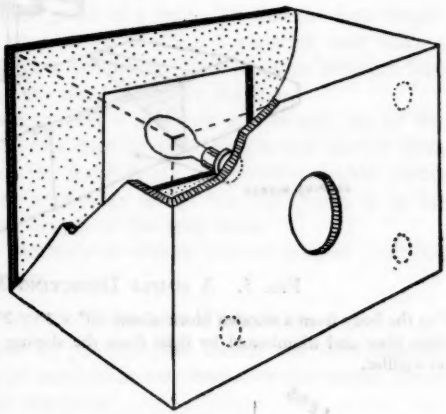

FIG. 4. CUT-AWAY DIAGRAM OF AN EPISCOPE

The body is a box. The lens aperture is shown in the front wall, into which the lens can slide with the aid of a round tin carrying the lens. On the inside of the front wall are the four lamps. The back wall has a picture aperture cut in it which should be about 5" square. Over this, on the outside of the box, fix a glass sheet. The picture is held against this by hand or by the aid of a wooden flap.

In making an episcope, note that the body can be a large cubical tin or a box made of wood. A reading glass of 3 to 4 inches diameter and about 6 inches focal length will be found suitable. This must be held in a tube (e.g., a cocoa or other tin) which slides in an aperture in the front of the box, so that the image can be focused accurately.

A Dissecting Microscope

This is a useful apparatus in the biology laboratory. A suitable design is shown in Fig. 5. It consists of a wooden block sawn to shape, and sand-papered smooth. The lens is a standard magnifying glass which slides on a rod for focusing. The object is placed on the horizontal glass plate and is illuminated by the light reflected from the mirror set at 45°.

A Filmstrip Viewer

This device allows of individual viewing of a filmstrip and is shown in Fig. 6. The body is made of wood. The filmstrip is pulled through the slots, illuminated by the mirror and examined through the lens—a rectangular reading glass is most suitable.

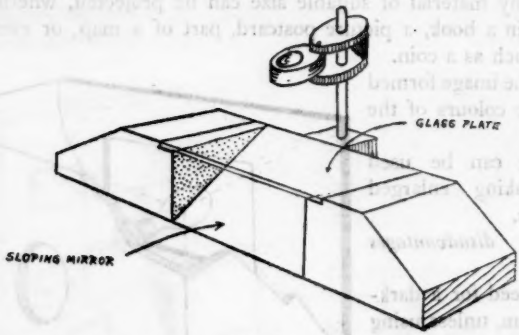

FIG. 5. A SIMPLE DISSECTING MICROSCOPE

Cut the body from a wooden block about 10″ × 3″ × 2″. The object is placed on the glass plate and illuminated by light from the sloping mirror. The hand lens slides on a pillar.

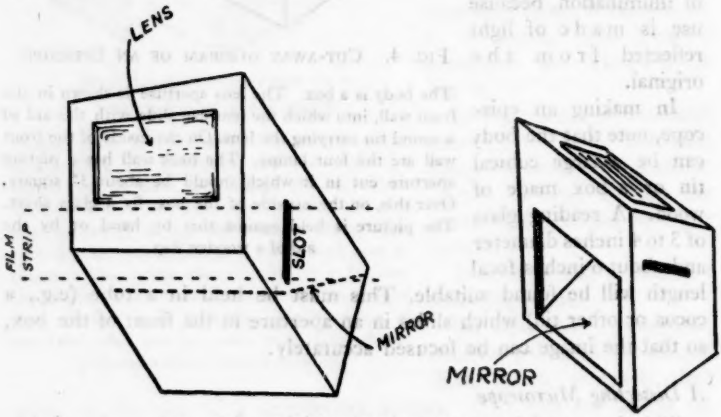

FIG. 6. A FILMSTRIP VIEWER

This is built from plywood. A rectangular reading lens is mounted on top in an aperture of suitable size. The film is pulled through a slot and illuminated by the mirror below.

A NOTE ON OPTICS

Spectacle lenses and reading glasses have already been suggested as the basis of home-made apparatus. Other sources of supply are the various lenses obtainable from war-surplus supplies which are sold in most large cities in India. The firms which specialize in science apparatus can usually supply the various items. They can also be obtained from photographic dealers, but usually at greater cost.

Science teachers will know how to find the focal lengths of lenses and how to use the basic formulae for setting up their apparatus

correctly. Those with no knowledge of science can proceed as follows, using common sense as well:

1. The image of an object at infinite distance is formed in a plane which passes through the focal point of a lens. To find the focal length of a lens form an image on a sheet of ground glass or taut tracing paper of a distant object, e.g., a tall tower. The distance between lens and screen approximates to the focal length of the lens.

2. Arrange all apparatus so that a lens can be brought up to the film or picture at a distance less than its focal length and moved from it to a distance greater than the focal length. In brief—provide plenty of focusing movement over a zone in which the mid-point is as far from the object as the focal length of the lens used.

3. Use trial-and-error methods to ensure correct relative positions before building any apparatus.

Making Lantern Slides and Filmstrips

These are normally made by photographic means and those interested in this can find details of method in two books by the writer which were prepared specially for teachers.[1]

Both however can be made by non-photographic means as follows:

1. Coat the glass plate or the clear celluloid film with a thin and even wash of egg-albumen or gum arabic. The required picture or diagram can then be drawn with Indian ink or water-colour paints.
2. Draw on glass or film with glass ink, obtainable from dealers in artists' materials.
3. Draw with glass crayons—special wax crayons made for the purpose.
4. Use a glass slide which has been smoked black and scratch the picture in this with a fine point. For permanence pour shellac varnish over the plate.
5. Use exposed and developed plates or films which are black and scratch the diagram into the emulsion with a needle or compass point.
6. Draw or paint the diagram on thin tracing paper and mount this between two clear glass plates.

Screens

The cheapest screen is a wall surface painted with matt white paint.

For a portable screen cut a piece of plywood of suitable size (about 40″ × 30″ will do). Screw batten pieces to the back to prevent warping. Paint the front matt white, or glue on to it a sheet of pure white blotting-paper.

Paint a two-inch-wide matt black edge round all screen surfaces.

T. L. Green

1. Green, T. L., *How to Make and Use Filmstrips* (Pitman Press).
2. Green, T. L., *The Visual Approach to Teaching* (Oxford University Press). *In preparation.*

THE ROLE OF SCHOOL BROADCASTS

They bring Zest and Variety to the Classroom

EVEN though India is said to be less given to the use of mechanical devices than some other countries, the radio and the gramophone are already very much with us. In cities and also in rural areas, from wayside restaurants and crowded bazaar shops, the passer-by will suddenly be arrested by the blare of an ill-tuned instrument, set at full volume, with a number of people loitering round it.

But how are they listening? Vacantly, emptily, merely as a variation from routine. All mechanical aids—aural or visual—can be brought before an audience and can secure passive absorption, but quite possibly without promoting active attention which alone can secure any permanent impression. For this latter purpose, training in their use is essential.

Schools and institutions of learning cannot be sheltered from life. If the radio is in the market-place, it should be in the school. It is too far-reaching an instrument for the schools to ignore; its potentialities are so great that it is incumbent on the schools to train their pupils in its full and adequate use.

This is recognized at the broadcasting end. Every broadcasting system, however meagre its resources, tries to reach the schools, as will be seen in the latest UNESCO publication, *Broadcasting to Schools*, which gives a report of the organization of school broadcasting services in different countries. Great Britain's school broadcasting service may claim to have reached maturity; Belgium, Canada, Australia, the Scandinavian countries, and various systems in the United States also have highly-developed services. The B.B.C. broadcasts today to about 18,000 schools. In the whole of India the different radio stations broadcast to about 600 in all. Among the reasons for this difference are, at the broadcasting end, the number of languages to provide for; A.I.R. Bombay, for instance, broadcasts to the general public in five different languages. At the listening end, the difficulties are the cost of radio sets, the difficulties of maintaining these in good condition, and of securing good reception.

What value and purpose have school broadcasts which make it incumbent on educationists to develop their use by overcoming the difficulties mentioned above? All the advantages can be summed up by saying that they help to bring the world into the classroom in many different ways and thereby enlarge the children's experience.

This is how the UNESCO Report sums up the contribution that school broadcasting can make to supplement the resources of the schools: '(*a*) School broadcasting can extend the pupil's awareness and understanding of the world of the past and of the present. (*b*) It can develop their incentive to read, study and think. (*c*) It can contribute

to and extend their enjoyment and appreciation of the arts.' And as to the means by which it can achieve these objectives, these are listed in the Report as '(*a*) The presentation of outstanding personalities and authorities. (*b*) Dramatizations, features, eye-witness descriptions and other methods giving the illusion of *being there*. (*c*) First-class performances of the arts—music, drama, and literature'. It is also pointed out that school broadcasting can often be of great assistance where the educational system has some particular deficiency, such as a shortage of qualified teachers or textbooks in a particular subject.

What does this work out to in practice? What are the actual aural aids available to the schools through the radio, say, in Bombay? It may be worth our while to take a detached look at the school broadcast programmes of recent years and see how far they link up with the curriculum and yet avoid repetition of classroom teaching.

Practical illustrations are always the most useful. Let us take the subject of science. A fresh interest can be given by re-grouping science topics under different types of activity: 'Science in the Service of Man', for instance, ranges from weed-killers to blood transfusion. Other such groupings are 'Science and Healing', 'Science in the Home', 'The Making of Light', etc. Such treatment gives a concrete and purposive approach to topics which have to be studied more analytically in the classroom.

Again, Basic Education seeks to relate the school subjects to some central activity or topic to give them meaning. So school broadcasts have presented a series of Basic Science talks on air and water, dealing with them from the various aspects of physics, chemistry and geography. Physiology has been approached with the slant of wonder: in 'Wonders of the Human Body' (another Basic Science series), for instance, the talk on man's marvellous hand compares it with the fin of a fish, the wing of a bird, the forelimbs of other mammals, to show what an important part was played by the anatomy of the hand in man's superior development.

Another mode of presentation has been the application of the dramatic method to certain topics of science—usually great moments in invention or discovery, such as the first operation under ether; the first inoculation to prevent hydrophobia; Edison listening to 'Mary Had a Little Lamb', the first recorded speech; and Marconi sending the first signal across the Atlantic. Here the dramatic reconstruction gives a zest to the topic, which makes it memorable.

Finally there is the straight talk on a new scientific topic like radar or atomic research or jet propulsion which, coming from an expert, is often appreciated by teachers, though the teacher may have to re-explain it to the listening class.

Nature study as a branch of science benefits at present very much from radio talks. This may seem strange, as nature study should be largely field-study, carried out in the open. But it is a subject in which there are few good textbooks applicable to Indian conditions,

and teachers have not yet had many opportunities for training in observation. Hence the popularity of talks by experts on the changing year, telling how plants and insects, birds and beasts behave through the seasons. A headmaster reported that he had listened to one such series with his class and found it full of interesting information, often previously unknown to teachers.

History too lends itself to treatment by radio. Topics of the curriculum can be re-grouped so that new angles of vision are secured. Particular events can be set in a framework of world history which gives them an added significance and leads to the attainment of wider horizons. Such a series broadcast for Bombay schools was 'Men and Women who Thought Differently', beginning with Socrates and ending with Mahatma Gandhi. A world view is always inspiring, so 'The Story of Law' traced the connexion between law and liberty, and showed the development of law from witch hunts and ordeals to modern democratic government and judicial procedure. Another such series, 'The Story of the Book', told of palm and papyrus and brick books of the ancient world, and reconstructed scenes like Tsai-lun presenting his invention of paper to the Chinese Emperor in the first century A.D., and Gutenberg inventing metal type in the fourteenth century. In fact, few subjects lend themselves to dramatic treatment better than history. This term, the S.S.L.C. class could listen to the reconstruction of episodes like the signing of Magna Carta, Charles I seeking to arrest the five members of Parliament, and the Fall of the Bastille, which could give a vivid colouring to the topics they have to study for the S.S.L.C. history syllabus. At other times, the illusion of being there is created in story forms: such as a series for juniors, 'Indian Children through the Ages', in which the history of the past was shown through the lives of children living in different periods.

In geography, the travel talk is the great means of securing an effect of actuality. It is not always easy in India to produce in the studio the man who has actually been in foreign parts, though other talkers have sometimes, though not always, succeeded in conveying the impression of having been on the spot themselves. Tales of exploration lend themselves to story and dramatic treatment. Regional geography can be approached through typical animals, children, and products of different regions, of which the first has so far proved the most successful.

In civics and administration, it is sought to make generalities intelligible to children by taking a concrete example of their working. The revised syllabus in Bombay State includes for the middle school an introduction to the topics of provincial and central administration. So a school broadcasts series, 'Your Government and You', sought to make intelligible to children the working of municipal Government through the provision of water-supply and street-cleaning; the working of the State Government by starting with the policeman in the street; and the working of the Central Government by starting with the postman bringing letters to the home.

Literature and music are both subjects that particularly lend themselves to aural aids. Practically all countries give priority to the contribution of radio to musical education. They emphasize the great usefulness of the musical education broadcast in analysing an important musical composition, in being able to demonstrate recurrent themes and variations and the role of different instruments. A.I.R., Bombay, has not undertaken anything so ambitious in its school broadcast programmes. But its programmes in community singing, where suitable songs are actually taught to a group of pupils in the studio, have been meeting a definite need for teaching songs that can be sung together by all Indian children at scout and other gatherings.

In literature, the appeal to the ear is strong. Here, as in music, the radio can produce first-class performances in the acting of plays, which would be something normally outside the school's experience. Some really good performances of Shakespeare's plays have been broadcast in the distant past. More frequent have been programmes such as 'Poets Read their Poems to You', where the children have been especially pleased to hear poems that occur in their classroom anthologies. Contemporary writers have also been invited to expound prose and poetry forms contained in the S.S.L.C. selections and these talks have been much appreciated by S.S.L.C. classes.

The B.B.C. has shown the contribution that can be made in the way of treatment of fiction by the radio, sometimes dramatizing episodes and incidents, sometimes depending only on good reading and following the adventures of one particular character. Such introductions to a great book can create an impetus for reading it. The B.B.C. introduced *Oliver Twist* and *Great Expectations*, each in three programmes, and school libraries reported a great demand for the books.

Aural aids are obviously very useful in language teaching, providing examples of correct idiomatic speech and construction. English language-teaching courses have been worked out by the B.B.C. and some have been made available for transmission from other stations. A B.B.C. series, 'English by Radio', has been used by adult students all over Europe; in India selections from it have been broadcast for schools. A.I.R's Hindi lessons have helped to spread the knowledge of Hindi to rural areas. A school in a remote power-station reported how it had used the series, 'Steps in Learning Hindi'.

The main purpose in this article has been to give a working idea of how the radio brings into the classroom an added element of colour, zest, variety and emphasis, which no school would like to refuse to its pupils. It has been argued that this is off-set by two main difficulties. School broadcasts cannot be made available, as visual aids can be, at just the time at which they could fit into some class topic or activity. They are at fixed hours, said to be inconvenient to particular schools. It must, however, be remembered that, if different stations broadcast at different hours, it is because the majority of the listening schools approve. If an agreed decision on suitable timings were come

to by the heads of schools, the broadcasting station would in all probability accept it. Schools themselves can fix the timings, but of course not by individual choice but by a majority decision.

Secondly it is often complained that listening conditions are very poor in schools; that programmes look better in the planning booklet than they sound in the actual reception as it comes through in the school, that teachers cannot tune in successfully, and that receiving sets go out of order. All this is quite true, but they are remediable conditions. Cheaper radio sets, specifically meant to meet the requirements of schools, and better servicing would be available with increasing use and experience. Most important of all, only by experience can teachers and pupils attain that handiness in the use of scientific aids which makes them usable in countries as different as Norway and the United States, and yet relatively difficult to use amongst us.

With a certain amount of flexibility and adjustment, schools should not find it difficult to undertake planned listening for every class. Talks are planned in series of four to seven items, which will come at the same time on the same day of each week. Each talk in a series is usually complete in itself, so that each can be listened to as an independent unit; though naturally the impression on the children is much more lasting and worth while if the whole series is listened to. A series can be found to suit every class, and no time-table need be so rigid that a class cannot find time to listen to one series during a term. Ten minutes' preparation in anticipation of the talk is a great help, and at the end some time is necessary for the teacher to revise, recapitulate, ask and answer questions. If a class has thus listened thoughtfully and carefully to a series a term, there has been a great gain in the technique of concentrated listening. After school life is over, the pupil will be capable of using the radio as a means of life-time education and intelligent enjoyment.

M. CHOKSI

AUDIO-VISUAL AIDS IN TEACHING

An Eleven-point Action Programme

THERE is undoubtedly a growing interest in, and discussion of, audio-visual education in India, but I wonder whether a majority of our teachers and educationists have a clear understanding of its place and significance in the educational pattern. Some people accept it just as a current fashion; others favour it because it provides an interesting diversion for students and gives them a welcome relief from their dull school studies. Under the circumstances, there is a danger that this important educational movement may be interpreted narrowly and may fail to play its part effectively by not being integrated properly into the day-to-day work of the schools. I propose, therefore, to deal with a few basic points which must be kept in mind both by the technicians and educational administrators who are to make provision for audio-visual education and by the teachers who are to make use of it in schools.

In the first place, we should appreciate the case for such education on psychological grounds. Our educational system has suffered for centuries from what may be called the tyranny of verbalism—the domination of the spoken and the written word. Words are media of communication through which ideas and concepts and experiences and the whole gamut of human emotions are shared by us with one another. We take speech so much for granted that we often fail to realize how difficult it is for words to convey precise ideas and nuances of meaning, even in the case of grown-up and educated persons. If words did not lend themselves to conflicting and confusing interpretations, perhaps the trade of the lawyers and the politicians would not be so flourishing and remunerative! If that is so in the case of educated adults when they carry on a conversation or exchange ideas, one can easily appreciate how many more such difficulties will arise when we are trying to educate young children, or illiterate adults, with a comparatively limited vocabulary. You may use words which appear to you quite clear and simple, but the child or the adult will put his own interpretation on them which may be quite different from yours. Any honest teacher who tries to check up on this point will feel a little humbled—or at least a little less ignorantly self-confident—if he carries out a test or an experiment to check up on the results of his verbal teaching. Hence the need to make teaching more concrete and realistic, and ideas and concepts clearer, by using various devices which will bring the eye to aid the ear in understanding.

This is really no new discovery or device. Ever since the dawn of intelligence, men have taken advantage of signs and pictures and various other types of illustrations to convey their ideas, and pictorial illustrations are probably as old as speech. It was only much later that education became predominantly book-ridden and direct experience as

well as the use of visual aids fell into the background. Even now there are many traditional devices like painting, folk drama and *bhajan mandalis* which are used in villages as media of mass education. What has happened in recent years, however, to give a new importance to audio-visual education is the application of the scientific technique in this field, and the invention of various kinds of projecting apparatus like the magic lantern, film and filmstrip projectors, epidiascopes, and aural apparatus like the gramophone and the radio, which have enormously expanded the scope and possibilities of such education. Thus, with the help of the radio, the microphone and the cinema screen, we can now speak, and present pictures, to millions of persons who were formerly beyond reach. In the field of mass education not only films—silent and sound—but also filmstrips, which present still pictures, and illustrations projected on the screen by the epidiascope, can explain many simple as well as complicated ideas effectively and in a spectacular manner. When, for instance, a good educational film is shown, it appeals to the eye and the ear simultaneously and its effective presentation of points that are to be high-lighted help the mind to grasp and retain. In the case of backward children, whose capacity to interpret the spoken words in terms of their own experiences is often very limited, the vivid presentation made through a well-produced film or a large-sized picture may well prove the teacher's best ally. We cannot, therefore, afford to ignore the great help that such devices can provide in all sorts of educational situations.

However, there are certain conditions that must be fulfilled and certain precautions that must be kept in mind if we are to derive full advantage from the use of these audio-visual aids. In the first place, it is necessary to keep the principle of variety in view. This means that visual aids are not limited to the film and the radio and similar other highly technical devices developed in recent years, but also include the whole array of aids, from the simplest to the most complex, both traditional and modern, through which knowledge can be imparted and ideas can be made clear and concrete. This is so, not only because different types of material can be presented best with the help of different kinds of audio-visual aids but also because most of our institutions either cannot afford to buy the expensive equipment needed for some of them, or cannot use them at all because electricity is not available in most places. In fact, in our country, where the conditions in the villages are primitive and most of the schools are very poor, there is special need to exploit fully the resources of the local environment and the cheaper types of aids in order to illustrate school lessons and make social education more interesting and realistic. Charts, pictures, diagrams, exhibitions of local products and crafts, and educational excursions should all be utilized for this purpose. I am often inclined to think that what stands in the way of teachers is not only lack of financial resources but also lack of ingenuity, initiative

and imagination. In some quite poor schools, I have seen a large number of appropriate illustrations prepared by teachers and children co-operatively. I suggest that the training colleges should take the lead in this matter and that every teacher should be taught to make his own aids and actually prepare and take with him a set of these to his school when he completes his training. This approach is necessary not only on grounds of economy but also because making things to meet felt needs is an educative experience for both teachers and children, yielding joy and giving training in skill and craftsmanship.

Closely allied with this is the question of the *economic* production of projecting apparatus and other technical equipment so that their price does not prove prohibitive for most schools. This cannot be done if we have to rely for everything on the costly apparatus imported from abroad. We must do something to encourage local manufacturers to tackle this problem and, what is more, help teachers so far as possible to make simple apparatus themselves. The Central Ministry of Education has been interested in this problem and this question, amongst others, was discussed, not long ago, at a Conference on audio-visual education which was attended by a UNESCO consultant, T. L. Green, who has made a special study of this subject. He was of the view that it is possible to make, with the help of locally available materials and at very low cost, simple apparatus with which filmstrips, slides and pictures could be projected and that teachers without any special skill could be easily trained to make them. The Ministry is planning to organize a training course, under the direction of Professor Green, to train teachers from different States for this work.

Thirdly, I should like to refer to an important caution that all teachers and officers who work in this field should bear in mind. There is a danger that these aids may either become a mere diversion or may be considered an end in themselves instead of being integrally related to the educational work of the school and the social education centres. While I have nothing to say against children being shown good films, filmstrips or pictures—for in any case, these will break the monotony of our classroom practices—this should *not* be confused with their *educational* use. The latter requires that they must be utilized to meet felt needs and must throw some light on what is being taught, helping children to understand the subject better and stimulating their thinking and imagination. If a film, for instance, is to be of real use, the teacher should know how to prepare the children beforehand for it, how to link it up with the lesson in hand, how to recapitulate and to organize follow-up activities in composition and other forms of self-expression. I remember seeing an educational film entitled 'The Wheat Farmer' which was meant specially for teachers and actually showed them *how* a film should be used in the class so as to become a vitally educative experience for the children and a starting-point for initiating all kinds of interesting and useful activities. The same thing applies to other types of aids. The whole problem of their

collection and preparation, their classification and maintenance and their actual use needs to be clearly thought out. If teachers will give due consideration to this point, they will find that school work will acquire a new meaning for them as well as their children, whose responses will be more intelligent and interested.

In conclusion, I should like to quote an 'eleven-point action programme' which was worked out at the conference to which I have referred above, since it focuses attention on some of the most important issues and problems which have to be tackled in this field:

1. Establishment of a Board of Visual Education which should have representation of educationists, teachers, technicians and others interested in this field, to consider general policy and programme.
2. Appointment of a whole-time officer in each State education department for developing audio-visual education.
3. Organization of exhibitions in different centres to popularize the use of, and clarify ideas about, visual education.
4. Training of teachers in visual education through training colleges and refresher courses, special stress being placed on how to use aids.
5. Establishment of co-operation between teachers, educationists and commercial concerns for the production of visual aids.
6. Use of training colleges and schools—both staff and students—for the production of suitable audio-visual aids.
7. Need for intelligent guidance in order to improve the standard, quality and variety of production.
8. Setting up in each State some type of educational museum where children's books, journals and all types of visual aids—national and foreign—may be available for consultation and study by all concerned.
9. Exploration of the methods of producing projecting instruments as well as visual aids economically, and encouragement of inter-state co-operation for the purpose.
10. Proper co-ordination and use of educational broadcasting.
11. Exemption from duty of audio-visual aids imported for educational institutions.

I trust that not only State Governments and official agencies but also private agencies and business interests will co-operate in this programme.

K. G. SAIYIDAIN

THE RADIO IN THE TEACHING OF GEOGRAPHY

An All-important Link between Classroom and Life

A PROPER understanding of geography can do much to help our younger citizens in forming a realistic vision of the world in which they live, and of their own country in relation to the world. India is a country of great achievements and of even greater possibilities. But if we are to develop all the latent resources of our country we must see it in its true geographical perspective. That is why I wish to insist that in our educational establishments we must utilize to the fullest extent all modern aids which can facilitate and enrich the geography teacher's work.

School broadcasting occupies a distinguished place in the British educational system. A council of administrative officials and teachers supervises the development of school broadcasting and the local education authorities are increasingly providing and maintaining receiving sets as part of the usual school equipment.

These broadcasts have helped 'to provide a mental stimulus beyond the ordinary resources of the school'. I do not in any way wish to underestimate the interplay of personality between the teacher and the taught, nor to question the utility of the former's teaching technique. My purpose is to draw attention to the immense value of the radio as a means of imparting a wider and more realistic knowledge to our children.

School broadcasts must necessarily fit into the ordinary syllabus and should include only subjects of lively interest. These adjustments should be the sole concern of the teacher. He should be in touch with the broadcasting authorities and should ascertain their future programmes and prepare his time-table to fit in with the broadcasting programme. It is the duty of the broadcasting authorities to consult various teaching bodies and thus plan their talks; and it is the duty of the teacher again to select those talks that fit methodically into his class-work and to leave out the rest. The school broadcasts that we have in India are to my mind not well planned and have no subject-wise or age-wise distribution. It is, however, encouraging to learn that something is being done. I suggest that educational officers should be appointed at every station and that it should be their duty to organize such broadcasts. It is essential that these officers should be teachers of ability and experience.

For the smooth and efficient running of these school broadcasts it is desirable that all broadcasts are under one control. This will create the continuity and unity in our educational policy that we lack so much, and will avoid the commercialism and propaganda with which broadcasting in some countries is associated.

The preparation of programmes confronts us with a problem of great magnitude. Professor E. G. R. Taylor was for some time in

charge of the geography talks broadcast by the British Broadcasting Corporation. I had the opportunity of discussing the problems of school broadcasting with her on several occasions. She divided the subject into Junior and Senior geography, the latter intended for students ranging from 11 to 14 or 15 years and the former for those ranging from 9 to 11 years.

The programme for the younger children consisted mainly of travel talks and were intended 'to supply elements of life and colour beyond the resources of the school, thus supplementing the geography syllabus'. From time to time people tell the children of Great Britain their first-hand experiences of life in other parts of the world and these details enrich the geographical knowledge of the school children and enliven the facts that their teacher has spoken about or that they have read in their geography books.

During the term from September to December some years ago, in the programme of geography broadcasts was included a series of talks on the Far East. The programme included such topics as 'In Cairo', 'A Village on the Nile', 'Living in Baghdad', 'An Indian City', 'An Indian Village' and 'An Indian Jungle'.

I had occasion to listen to the talk 'In Cairo' in a London school and was amazed to witness the interest and enthusiasm exhibited both by the teacher and by the pupils. Before the broadcast the teacher gave each of us an illustrated pamphlet issued by the Broadcasting Corporation about the forthcoming talk, which helped us to visualize the scenes we were going to hear about. Then he located the place of the talk on the map a few moments before the talk began and said a few words about the geography of the place. After the radio talk the teacher asked questions about it and repeated some of the facts which we had heard. Another useful plan is for the teacher to ask the students to write down as homework a description of the place they have heard about, illustrating their facts from the pamphlet. This will, I think, train their memory and teach them to look at pictures with a seeing eye.

The talks for the senior students were about specific geographical problems and were generally given by speakers having first-hand knowledge of the problems. They, in the words of Professor Taylor, contribute 'vivid description and up-to-date knowledge'. The last term included broadcasts on (*a*) Managing the Sea-coast Erosion and Accretion; (*b*) Understanding Climate (America); the Canadian Farmer pushes North; (*c*) Mud and Floor; the Mississippi, Friend or Enemy?

In this case also an illustrated pamphlet was issued to accompany each talk. A summary of each broadcast was also included to suggest material for preparation or follow-up. The teacher, in this case too, related the pictures and the maps in the pamphlets to the usual classroom maps.

It should not, therefore, be difficult to realize that the radio can be made a vital aid to the teaching of geography. Education today is not merely a 'preparation' for securing jobs. The child of today needs

preparation for life, both in work and play; and it is high time that our educational authorities realized that all-important link between classroom activities and life.

Reading books and listening to the class teacher must inevitably become monotonous and much that is taught in this way, if unrelieved, is neglected as dull routine. Listening to a radio is in itself a thrill for children. They look forward to it as something interesting and I have observed that, when they return home, they relate to their parents with great pride what they have heard on the radio, and anxiously await the next broadcast.

The teacher can look to the broadcast talks to provide what he himself can supply only with difficulty. They make it possible for world-known travellers with first-hand experience to address huge audiences without 'suffocating the atmosphere'. Specialized knowledge of experts is available for the whole community, so that broadcast talks enrich the curriculum and supplement the work of the teacher who may lack specialized knowledge.

In India today, rural schools deserve and should receive special treatment, inasmuch as the equipment of the schools in general and often the qualifications of the teaching staff are inferior to those of urban schools. We can now bring to the village pupil resources from which he can make contact with the outside world. For rural schools, therefore, broadcasting is of special value. Series of talks should be designed for rural schools to give them what urban schools already possess and to compensate as far as possible for the lack of modern equipment and up-to-date textbooks.

The problems of technical installation and reception may require the help of the broadcasting authorities and for this they may have to put the services of some of their technicians at the disposal of schools. Advisory visits may be paid to all member schools and advice given to the local authorities free of cost or on payment of a small fee. The state should aid schools in effecting this educational development by financial help or gifts of apparatus. This is a real investment. It is moreover an excellent way in which public-spirited men and women can help the community.

Some of us may be tempted to dismiss the idea of wireless lessons with amused contempt, as being divorced from real teaching. Yet this attitude cannot be justified. The teacher is now used to the blackboard and chalk, to maps and pictures, to models etc., as aids to his teaching. He has no fear that such aids might interfere with his domination over his class or endanger discipline. In the same way, there is no need for the teacher to be jealous of the superior qualifications of the experts who can address his pupils through this new medium. The yeoman service of our teachers will still be the key to the successful running of our schools.

V. S. MATHUR

A VISUAL AIDS BIBLIOGRAPHY

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British Council, 3 Hanover St, London, W.1. (and centres in India).

British Film Institute, 162 Shaftesbury Avenue, London, W.C. 2.

British Universities Film Council, c/o G. Kitson Clarke, Trinity College, Cambridge.

Educational Foundation for Visual Aids, 33 Queen Anne St, London, W.1.

National Committee for Visual Aids in Education, 33 Queen Anne St, London, W.1.

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T. L. GREEN

BOOK REVIEWS

Setting Up Your Audio-Visual Education Program. Prepared by the Audio-Visual Education Association of California. 8½″ × 5½″. Pp. 34. Stanford University Press, California. $1.

A charmingly illustrated and well-produced booklet, useful for all heads of schools who are contemplating an audio-visual programme for their schools.

Section I deals with the organizing of the visual-aids programme and it clarifies some vital questions about the why, wherefore and how of visual aids in education. The illustrations on each page are cheerful and vivid.

Section II deals with equipment and facilities and is again copiously illustrated with photographs and sketches. This section deals with audio-visual aids from field trips, community resources, bulletin boards to the development of school museums. It also makes suggestions for different types of schools with limited facilities. The pictures and diagrams illustrate methods of preparing an ordinary classroom for easy and effective use of projected audio-visual materials.

Section III deals with the education of practising teachers. This illustrates how the head of a school can encourage, help and check on the staff in the effective carrying out of an audio-visual programme. Not only is this section useful for principals but for the teachers themselves there is a 'Guide to Good Use' which will be of great help.

This booklet should be in every school staff library. It is easy and quick to read as all the matter is in the form of short questions and answers. At first sight it may appear sketchy but it is packed with useful information and certainly makes cheerful reading with its amusing illustrations and sketches.

* * *

Five Senses of Man: The Human Eye; Seeing; Hearing; The Priceless Gift of Hearing; Taste and Smell. Wall-charts in Hindi and English 20″ × 30″. AMA Ltd, Bombay. Rs 15 per set.

Each chart is packed with smaller illustrations having both English and Hindi captions.

'The Human Eye' illustrates the organs of sight and the three major defects of eyesight, in colour. Along with this, and probably intended by the publishers for use together with the chart on the Human Eye, is the one called 'Seeing'. This chart has not been successfully co-ordinated with the other and therefore to some extent defeats its purpose. Some of the pictures do not exactly illustrate the captions: for example the caption 'Our Eyes relaxed under Nature's Plan' is illustrated by a picture of a boatman standing in his canoe with an oar in his hand; and sweeping captions like 'Almost all our physical strain is caused by eyes alone' are rather questionable.

The two charts 'Hearing' and 'The Priceless Gift of Hearing' are better co-ordinated. One illustrates by pictures the organs of hearing in the human being and also gives pictures of animals that have a keen sense of hearing. The second, illustrates the different kinds of sounds, their quality, intensity and timbre.

The chart 'Taste and Smell' illustrates the organs of taste and smell in human beings and contains pictures of some animals that have and others that have not a sense of smell. The different types of smells—spicy, fruity, putrescent and ethereal—find a place on this chart. This chart is vividly coloured, perhaps a little too vividly.

These charts could be used by some secondary schools and should be within the reach of primary schools as well as they are inexpensive. One feels however their usefulness could have been enhanced if they had not been so overcrowded with pictures and if they had avoided several irrelevant flourishes in each illustration. For example, the sensory organ of smell is illustrated by the head of a woman with the nasal organs in detail. The first thing that strikes one as one looks at the picture is the large pair of earrings in the woman's ears and the colourful flowers in her hair. This detracts from the main feature, the nose, which should be the focus of attention.

A greater attention to detail and the avoidance of the use of two languages together for captions would have definitely improved these teaching aids.

Oxford Junior Encyclopaedia. Vol. VII, Industry and Commerce. Edited by LAURA E. SALT and ROBERT SINCLAIR. Cr. 4to. Pp. xiv + 494. Oxford University Press. 1951. 30*s.*

Time was when the children of the aristocracy were carefully shielded from all knowledge of industry and commerce. Matters have changed so greatly since then that the man who grows up without some understanding of banking or commerce must feel lost in this world, incapable of looking after himself and his affairs.

In so far, then, as it is likely to be of practical use to the children for whom it is meant, the volume under review is perhaps one of the most important of the series of twelve volumes which will make up the set of the *Oxford Junior Encyclopaedia.*

One somehow expects an encyclopaedia about industry and commerce, even one meant for children, to be a little heavy and dreary. It is surprising to find that this volume becomes so engrossing that it becomes difficult to put it down. Explained simply with the correct historical backgrounds but without verbosity, the subjects are fascinating—one almost begins to think one understands what makes the wheels of commerce go round. As in the previous volumes the subjects are arranged in alphabetical order, which makes it extremely easy to trace whatever one is looking for. The writing is of the highest order, clear, informative and extremely readable. The clean large type, the layout and excellent paper all contribute to make it pleasant to handle. Hundreds of photographs and pictures illustrate the text, while the coloured plates are truly beautiful.

Thirty shillings is not a great deal to pay for the advantage of owning this volume. Whether a school buys it for its library, or parents buy it ostensibly for their teen-age children, but actually for themselves, the volume will prove a gilt-edged investment.

* * *

Modern Science. By M. WEBB and M. A. GRIGG. 7¼″ × 5¼″. Book I. Pp. 190. 4*s.* Book II. Pp. 212. 5*s.* 6*d.* Book III. Pp. 196. 6*s.* Cambridge University Press. 1951.

At first sight these books seem very attractive and closer examination confirms this impression. If the price is as reasonable in India as it is in England, *Modern Science* will be widely used and prove a definite asset to classroom and library.

These books give courses which will be valued by both teacher and student because of their simple and direct approach. It is good to find the simple suggestions for writing up experiments, which are not in a stereotyped form but the direct 'What I did, What happened, Why it happened'. The authors are clever in what they do *not* say. They do not try to give every detail but leave it to the student to discover or to the teacher to discuss. Not much theory is given. One supposes that this is left to the discretion of the teacher and depends on the age, ability and type of class. There is the essential minimum of mathematical treatment and formulae but numerical examples are not included. It may well be argued that such are only necessary for the specialist and that it is the facts of a relationship that are important. The diagrams are excellent and up-to-date. What interesting lessons could be based on many of them, for instance that of the atmospheric ocean, showing the heights of the troposphere, stratosphere and ionosphere!

Book I contains four sections devoted respectively to the science of the air, the force of gravity, water, and biology. The experiments are briefly, but clearly, described and illustrated, and one can say from practical experience that they work. It is good that the danger of the experiment of burning hydrogen from a jet is emphasized. This should never be done by the children themselves, enough time should be allowed to elapse for the generating apparatus to be cleared of all oxygen, and danger of leakage guarded against, before the jet is lit. In making oxygen it has been found that the addition of an equal quantity of fine silver sand to the oxygen mixture causes the gas to be given off more steadily and lessens the chance of explosive conditions.

The experienced teacher can easily add experiments to those described: for instance, the use of ignition tubes, made if possible by the students themselves, for observing the effect of heat on substances like red oxide of mercury, sulphur or coal. Young children also enjoy experiments in

test tubes with litmus and like to grow crystals of copper sulphate or alum.

The biological section is, naturally, especially planned for English conditions. While physical science is universal the botany and zoology of countries differ to some extent. One would like an Indian edition of this book in which the biological section is written with the same excellence and method but more suited to the conditions and specimens available in India.

Book II is also divided into four parts: The structure of matter, heat, work and machines, and biology. Here are introduced the beginning of atomic theory and the splitting of the atom. It is so up-to-date that a picture is given of the atomic bomb exploding under water at Bikini. The section on heat includes explanations of sea breezes and ocean currents, radiation, measurement of heat, latent heat and weather study. We learn how engineers believe the pyramids were built and (especially for boys) how the internal combustion engine works. The biology section deals with animal life in the garden especially with small creatures like worms, slugs, spiders, ants and bees. It continues with a valuable section on soil, its nature and improvement, and concludes with details of flowering plants.

Book III begins with finding direction. Part 1 gives a little simple astronomy and magnetism. Part 2 deals with electricity. Some of this seems quite advanced but perhaps it is time we ceased to make a mystery of things like dynamos and motors which have become so familiar. It is inevitable that as the difficulty and complexity of the subject increases the whole story cannot be told in a short compass, but this is the teacher's opportunity. A valuable part of this section is that on household electricity. Many teachers will find that it gives them just what they want to fill in the gaps in their practical knowledge of what is happening today.

The biological section deals with animals of the countryside: snakes, lizards and birds, cows and rabbits, squirrels and mice. In this section also we find an account of how a plant lives, transpiration and respiration and finally moulds and bacteria. An account of sanitation and the action of a septic tank might usefully have been added.

All three books are beautifully produced on good paper so that they are a pleasure to handle. Each contains lists of experiments to be performed, questions to be answered, hints on the apparatus required and its use, lists of books for the science library and an index.

Surely we have here the beginning of a new type of textbook containing a comprehensive study of nature quite sufficient for any intelligent citizen.

* * *

A Concise History of India. By JAMES H GENSE, S.J. Cr. 8vo. Pp. x + 338. Macmillan & Company Ltd. 1952. Rs 3-4.

Coming from the pen of an experienced and trained educationist and historian with many books of Indian history and school textbooks to his credit, the students of the S.S.C. class can feel safe when they study their history from this book. The bewildered and overburdened students in our schools will be grateful to the author for making their task easier when going through an enormous course replete with facts and dates beginning from ancient India and ending with the present day.

The book is arranged so well, considering the massive bulk of history it includes, that it can satisfy the needs of all students—those aspiring for the highest class or those satisfied with just getting through their examination. It is difficult to expect a perfect textbook when the price is to be taken into consideration. The inclusion of additional maps and illustrations would undoubtedly make for easier understanding.

The book is without any undue bias, such as is noticed in many current history books, whose authors glory in imaginative creations of heroes and movements for which historical records provide little support. It is a valuable addition to the small number of good history textbooks available.

Printed by Hugh Warren at the Wesley Press and Publishing House, Mysore City and Published by Geoffrey Cumberlege at the Oxford University Press, Bombay

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